

How Does Energy Flow Through an Ecosystem?

Student Lab Instructions

Purpose: To gain an understanding of how energy flows through an ecosystem.

Materials: (5) 100 mL beakers, (1) dropper, one colour of food colouring per group, timer, notebook.

Procedure:

1. Each group should have five 100 mL beakers. Each beaker represents one trophic level and the sun.
2. Fill the first beaker with 80 mL of water. This will be your energy source (aka the sun). Add two drops of food colouring (of your choice) to the 80 mL of water.
3. Next determine who will be the producer (1 person), consumers (3 people), and recorder/time keeper (1 person).
 1. The recorders' responsibility is to record all data and to keep track of how much "energy" (represented as water measured in mL) reaches the last trophic level.
 2. The time keepers' responsibility is to make sure that the group follows the following guidelines for trial #1: The first trophic level gets 1 minute to get as much water from the energy source as possible, followed by the remaining trophic levels decreasing by 15 seconds each (2nd-45 seconds, 3rd-30 seconds, 4th-15 seconds).
4. Everyone who is representing a trophic level gets an empty 100 mL beaker.
5. Sit all of the people representing a trophic level in a line. When the time keeper starts the trial, the first person in line will remove water from the initial beaker (energy source), with their dropper, and dispense the water into their beaker. Make sure you record how much water you attained in each trophic level in table #2. After the corresponding time increment is over, stop removing water and pass your beaker and dropper to the next person in line. Once the time has expired for all trophic levels, record your data and reset the experiment.
6. Calculate your results.
7. Record all data in the tables below.
8. Reset the experiment, and run trial #2 - the same as trial #1.
9. Record your data in the table below.
10. Now, for trial #3 add another trophic level. Use the same time increments and record the data in the table below.

Name: _____

Table #1: Record of Change in Volume at end of Trophic Levels.

TRIAL	TROPHIC LEVELS TESTED	INITIAL VOLUME (ML) IN "SUN"	FINAL VOLUME (ML) IN LAST TROPHIC LEVEL	CHANGE IN VOLUME (ML)	PERCENT CHANGE IN VOLUME (%)
1	1-4				
2	1-4				
3	1-5				
4	1-5				

Table #2: Record of Energy Transferred (Water) at each Trophic Level.

TRIAL	VOLUME TRANSFERED TO PRODUCER (ML)	VOLUME TRANSFERED TO PRIMARY CONSUMER (ML)	VOLUME TRANSFERED TO SECONDARY CONSUMER (ML)	VOLUME TRANSFERED TO TERTIARY CONSUMER (ML)
1				
2				
3				
4				

Analysis:

1. After completing the first two trials, what do you notice about the amount of water throughout the experiment?

2. As you worked up the trophic levels in this experiment, the time increments became shorter. What was this supposed to represent?

Name: _____

3. Are your results consistent with the “10% rule”? If they aren’t consistent, how would you alter the experiment to correctly model the 10% rule?

**Reset the experiment with your alterations. Run the experiment again and see if you can get close to the 10% rule.

5. What happens with five or more trophic levels? Why do you think this occurs?

6. Graph your results below. *Use proper axis headings, graduations, etc.*

